CLAIMS

What is claimed is:

1. A fiber-ring optical resonator, comprising:
   a. a resonator fiber; and
   b. a transverse fiber-ring resonator segment integral with the resonator fiber, the resonator segment having a circumferential optical path length different from the circumferential optical path length of the resonator fiber adjacent to the resonator segment so that the resonator segment may support a substantially circumferential resonant optical mode near an outer surface of the resonator fiber segment. [Is near defined in the spec?]
2. A fiber ring optical resonator of Claim 1, wherein the fiber-ring resonator segment is formed by cylindrical processing of the resonator fiber.
3. The fiber-ring optical resonator of Claim 2, wherein the fiber-ring resonator segment is formed by removal of material from the resonator fiber.
4. The fiber-ring optical resonator of Claim 2, wherein a fiber-ring resonator segment is formed by depositing material on the resonator fiber.
5. A fiber-ring optical resonator of Claim 2, further including a second optical element, the second optical element and the resonator segment being arranged so as to permit evanescent optical coupling between the circumferential resonant optical mode of the resonator segment and an optical mode of the second optical element.
6. The fiber-ring optical resonator of Claim 1, wherein the resonator fiber includes a delocalized-optical-mode suppressor.
7. The fiber-ring optical resonator of Claim 6, wherein the mode suppressor includes a hermetic carbon coating element.
8. A fiber-ring optical resonator assembly comprising:
   a. a resonator fiber;
   b. a transverse resonator segment formed on the resonator fiber, the transverse resonator fiber segment forming a fiber-ring resonator;

c. the resonator segment located on the resonator fiber between a first and a second segment of the resonator fiber;

d. a delocalized-optical-mode suppressor including a hermetic carbon coating element on at least one of the first and second segments of the resonator fiber;

e. a transmission fiber optic waveguide, the waveguide having a fiber-optic-taper segment; and

f. a taper positioner, the taper positioner arranged for engaging the taper segment of the transmission waveguide in proximity to the fiber-ring resonator so as to enable evanescent optical coupling of the transmission waveguide and the fiber-ring resonator.

9. The fiber-ring optical resonator assembly of Claim 8, wherein the taper positioner is further adapted to position the fiber-optic taper segment longitudinally displaced from a longitudinal midpoint of the fiber-ring resonator, thereby substantially reducing undesirable taper-induced optical loss in the fiber ring resonator.

10. The fiber-ring optical resonator assembly of Claim 8, wherein the resonator fiber has a plurality of resonator fiber segments formed thereon and at least two of the resonator fiber segments are arranged so as to permit evanescent optical coupling therebetween.

11. A method for altering transmission of an optical signal through a transmission optical waveguide, comprising the step of evanescently optically coupling a fiber-ring resonator assembly to a transmission optical waveguide, thereby altering transmission of an optical signal through the transmission optical waveguide if the optical signal is substantially resonant with the fiber-ring resonator assembly, the fiber-ring resonator assembly including:

a. a resonator fiber; and

b. a transverse fiber-ring resonator segment integral with the resonator fiber, the resonator segment having a circumferential optical path length different from the circumferential optical path length of the resonator fiber adjacent to the resonator segment so that the resonator segment may support a substantially circumferential resonant optical mode near an outer surface of the resonator fiber segment.

12. A method for altering transmission of an optical signal through a transmission optical waveguide, comprising the steps of:

a. evanescently optically coupling a fiber-ring resonator to a transmission fiber-optic waveguide having a fiber-optic taper segment for evanescent optical coupling to the fiber-ring resonator;

b. modulating a coupling condition between the transmission optical waveguide and the fiber-ring resonator, the coupling condition being varied from an over-coupled condition between the transmission optical waveguide and the fiber-ring resonator and a critically-coupled condition between the transmission optical waveguide and fiber-ring resonator.

13. The method of Claim 12 wherein the coupling-condition modulating step includes the step of modulating round-trip optical loss of the fiber-ring resonator assembly.

14. The method of Claim 12 further including the step of evanescently optically coupling a second transmission optical waveguide to the fiber-ring resonator assembly, thereby enabling transfer of the optical signal between the first transmission fiber optic waveguide and the second transmission fiber optic waveguide when the optical signal is substantially resonant with the fiber-ring resonator optical mode.

15. The method of Claim 12 wherein at least one of the fiber optic resonators includes a plurality of fiber optic ring resonator segments, at least two of such segments being evanescently optically coupled therebetween, and wherein the refractive index of at least one of the fiber-ring segments has been modified by a processing beam.

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